

DETAILED ACTION

Claim Objections

Claims 4-7 and 13 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

1. As to claim 4, the phrase in Claim 1 "patterned structure" inherently describes a regular occurrence of elements, and Claim 3 defines the patterned structure as being comprised of trenches.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

2. Claim 1 recites the limitation "the thermal grating" in line 6. There is insufficient antecedent basis for this limitation in the claim. For purposes of examination, examiner interprets the phrase to refer to the patterned structure that is being measured.
3. Claim 1 recites the limitation "the surface profile" in line 11. There is insufficient antecedent basis for this limitation in the claim. For purposes of examination, examiner interprets the phrase to refer to the profile of the patterned structure that is being measured.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-11, 13-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Banet et al (United States Patent 6,256,100).

4. As to claim 1, Banet teaches a method for measuring a patterned structure comprising:

exciting the structure (column 5, lines 14-18) by irradiating it with a spatially periodic laser intensity pattern (Figure 1B, element 14) in order to generate surface acoustic waves (column 5, lines 43-45);

diffracting a probe laser beam (Figure 1A, element 18) off the thermal grating to form a signal beam (column 2, lines 35-37);

detecting the signal beam (Figure 9, element 224) as a function of time (Figure 8) to generate a signal waveform; and

determining at least one property of the patterned structure (column 2, lines 37-40) based on the effect of the surface profile on surface acoustic wave phase velocity (column 9, lines 23-26).

5. As to claim 3, Banet teaches everything claimed, as applied above in claim 1, in addition the patterned structure is comprised of trenches equal to or less than approximately 2 .mu.m in width (Figure 7A, 7B, and column 8, lines 61-63).

6. As to claim 4, the claim is rejected for the same reason as claim 3, referring to Claim Objections, above.
7. As to claim 5, Banet teaches everything claimed, as applied above in claim 4, in addition the patterned structure further comprises a periodic array of linear trenches (Figure 7A, elements 123).
8. As to claim 6, Banet teaches everything claimed, as applied above in claim 4, in addition the patterned structure further comprises a two-dimensional periodic array of trenches (Figures 7A, 7B).
9. As to claim 7, Banet teaches everything claimed, as applied above in claim 4, in addition the trenches are fabricated in a silicon substrate (column 2, line 67).
10. As to claim 8, Banet teaches everything claimed, as applied above in claim 3, in addition the trenches are fabricated in a thin film (Figure 1A, element 10).
11. As to claim 9, Banet teaches everything claimed, as applied above in claim 1, in addition the at least one property comprises trench depth (Abstract; examiner reads "thickness of the overlying layer" as not different from "depth").
12. As to claim 10, Banet teaches everything claimed, as applied above in claim 1, in addition the at least one property comprises trench width (column 4, lines 21-24).
13. As to claim 11, Banet teaches everything claimed, as applied above in claim 1, in addition the at least one property comprises a depth profile of the trench structure (Figure 6).
14. As to claim 13, Banet teaches everything claimed, as applied above in claim 5, in addition the determining step further comprises combining measurements along and

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across the trench structure to determine both trench depth (column 3, lines 35-38) and width (column 4, lines 21-24).

15. As to claim 14, Banet teaches everything claimed, as applied above in claim 1, in addition the determining step further comprises combining measurements within and outside the patterned area to separate the effect on the surface acoustic wave velocity caused by the trench structure from the other effects such as film thickness (column 6, lines 30-38, and Figure 5 displays measurements beyond the edge of the structure).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Banet et al (United States Patent 6,256,100) in view of Fuchs et al (United States Patent 6,795,198).

16. As to claim 2, Banet teaches everything claimed, as applied above in claim 1, with the exception of the exciting step further comprises a spatially periodic laser intensity pattern having a period ranging from 1 to 20 microns. However to do so is well known as taught by Fuchs. Fuchs teaches the exciting step further comprises a spatially periodic laser intensity pattern having a period ranging from 1 to 20 microns (Figure 1B, elements 15x, and column 6, lines 3-6). It would have been obvious to one of ordinary skill in the art at the time of invention to have the exciting step further

comprise a spatially periodic laser intensity pattern having a period ranging from 1 to 20 microns, in order to increase the resolution of the measurement.

Claims 12, 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Banet et al (United States Patent 6,256,100) in view of Rogers et al (United States Patent 5,546,811).

17. As to claim 12, while Banet teaches everything claimed, as applied above in claim 1, in addition determining multiple parameters of the trench structure (column 3, lines 35-38, and column 4, lines 21-24), Banet fails to teach the determining step further comprises combining measurements at multiple acoustic wavelengths. However to do so is well known as taught by Rogers. Rogers teaches the determining step further comprises combining measurements at multiple acoustic wavelengths (column 2, lines 21-26). It would have been obvious to one of ordinary skill in the art at the time of invention to have the determining step further comprises combining measurements at multiple acoustic wavelengths, in order to speed the measuring process by making simultaneous measurements.

18. As to claim 15, while Banet teaches everything claimed, as applied above in claim 1, in addition the determining step comprises analysis of the signal waveform with a theoretical model (column 3, lines 11-15), Banet fails to teach the analysis is based on elastic properties of the structure. However to do so is well known as taught by Rogers. Rogers teaches the analysis is based on elastic properties of the structure (abstract; examiner reads stress analysis to be not different from elastic properties). It would have been obvious to one of ordinary skill in the art at the time of invention to have the

analysis be based on elastic properties of the structure, in order to eliminate production techniques that produce undesirable mechanical stress in the films.

19. As to claim 16, Banet teaches everything claimed, as applied above in claim 1, with the exception of the determining step comprises analysis of the signal waveform with a model based on an empirical calibration. However to do so is well known as taught by Rogers. Rogers teaches the determining step comprises analysis of the signal waveform with a model based on an empirical calibration (column 123, lines 64-66). It would have been obvious to one of ordinary skill in the art at the time of invention to have the determining step comprise analysis of the signal waveform with a model based on an empirical calibration, in order to determine film desirability.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JARREAS C. UNDERWOOD whose telephone number is (571) 272-1536. The examiner can normally be reached on Monday-Friday 0530-1400.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley can be reached on (571) 272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/J. C. U./
Examiner, Art Unit 2877

Jarreas Underwood
Patent Examiner
Art Unit 2877
6/19/2008

/L. G. Lauchman/
Primary Examiner, Art Unit 2877

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